Urology in military medical practice

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MILITARY CAPABILITY is only rarely directly influenced by urological conditions, but some urological symptoms (eg, renal colic, urinary infections and bladder instability) can severely and acutely degrade performance, and military environments can predispose to problems such as injuries, renal calculi and sexually transmitted diseases.

Opportunities exist to reduce these problems by screening and by promoting effective prevention strategies through general knowledge of service personnel and advice to individuals and commanders.

This review is not all-inclusive, but covers the topics of most relevance to health service practitioners in the Australian Defence Force.

Synopsis

- Urological conditions are reasonably frequent in the ADF population.
- Renal calculus disease is directly related to hydration state.
- Renal trauma is not infrequent and causes concern about the timing and appropriateness of renal imaging. Hypertension is a serious, insidious consequence of renal injury.
- Testicular carcinoma is a clinically significant malignancy in the military population and the military system can be used to improve treatment results.
- Urinary tract infections create different problems for women and men. Treatment for women is effective, but the management of chronic prostatitis is still problematic.
- Bladder function disorders can be helped by medication, but the side effects must be accepted.

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Renal calculus disease

Renal calculus disease has an estimated prevalence of 2%–3% in the general population,[1] with a peak incidence between the ages of 20 and 40 years.[2,3] The recurrence rate among people who form a kidney stone is 10% at one year, 35% at five years and 50% at 10 years.[4] Blacklock reported that the highest incidence in Royal Navy members was in cooks and engine room personnel.[3]

First time stone formers had significantly lower urine volumes than age-matched controls in a 5-year randomised prospective study by Borghi et al,[5] who concluded that a large intake of water is the initial therapy for prevention of stone recurrences. A prospective study by Curhan et al of 45 619 males aged 40–75 years with no history of calculi showed that stone formers consume less fluid and that the relative risk is volume related.[6]

A cause for renal calculus disease can be found in 97% of cases.[7] Accurately prescribing treatment is essential to increase compliance, as reduced compliance with treatment has been noted in 36% of cases.[8] Dietary changes are sometimes necessary, but inappropriate calcium intake reduction can be

1 Fluid intake and risk of kidney stone disease[6]

Fluid intake in mL	Relative risk
< 1275	1.0
1275–1669	1.05
1670–2049	0.82
2050–2537	0.72
> 2537	0.52

Fluid intake on operations can be maintained using the Camelbak container.

detrimental and may increase the risk of recurrent calculi.[9] Unfortunately, some advice may not be conducive to good order: 240 mL of beer a week reduces the risk of stone recurrence,[10] but soft drinks may increase the risk.[11]

The principal preventive measure is adequate hydration, and therefore all personnel, especially stone formers returning to duty after investigation, need access to a plentiful supply of palatable fluids.

Renal trauma

Renal trauma is a risk of military training and operations and its sequelae are important.

Renal trauma frequently occurs in patients with other serious injuries, and in this context deciding when or even whether to image the renal tract by intravenous urography, ultrasound or computed tomography is sometimes difficult. Computed tomography is the modality of choice to image the injured kidney, but until transportable machines suitable for military use become available the intravenous urogram remains the standard.

A 10-year prospective analysis by Mee et al of 1146 patients showed that 63% of patients with penetrating injuries (88/139) had major renal injuries, but only 4.4% of patients with blunt trauma (44/1007) had major renal injuries.[12] In a subgroup of 812 patients with blunt trauma, no macroscopic haematuria and no shock, 404 had renal imaging and 408 did not. No major renal injury was noted on imaging and no delayed renal surgery was required in the group without imaging. It was therefore recommended that all penetrating injuries, blunt injuries with macroscopic haematuria or microscopic haematuria and shock at least have an intravenous urogram. Blunt injuries without shock can be observed.

Blood pressure monitoring must continue for many years after a renal injury.

Hypertension after major renal trauma has been noted in 29%–57% of cases[13] and occurs most often in young males with blunt abdominal trauma. It may present acutely, with an interval from injury between two days and 14 years.[14] The mechanisms include renal and branch artery stenosis or compression, arteriovenous fistula or external renal compression from resolution of the haematoma (Page kidney) and involve activation of the renin–angiotensin–aldosterone system.

Massumi et al[15] documented the renal injuries and clinical features of 39 patients with hypertension after renal trauma and their findings are summarised in Box 2. Cases of hypertension presenting within one year of injury had a much better prognosis.[15] All patients with a renal injury should thereafter have their blood pressure monitored closely.[16]

2 Renal hypertension pathology and causative injury in 39 patients[15]

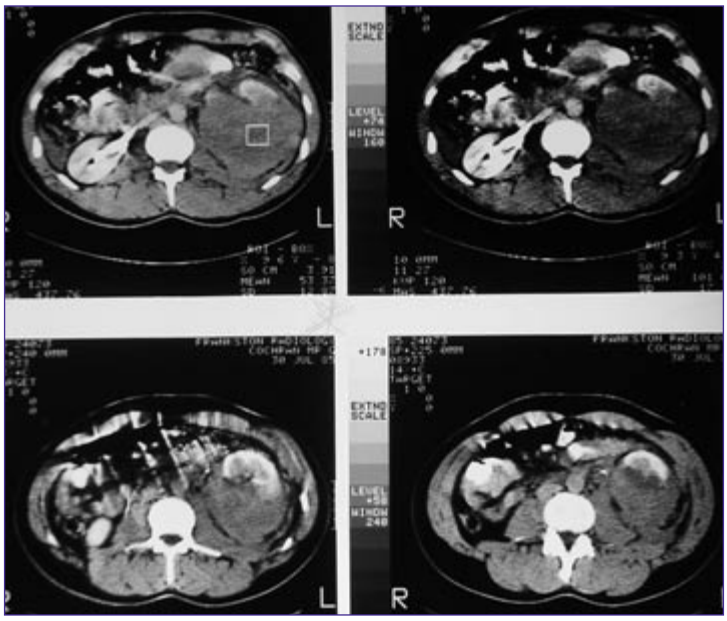
	Renal pathology		
	Arterial occlusion	Arteriovenous fistula	Page kidney
Cause of injury			
Motor vehicle accident	25	0	4
Fall	3	0	7
Blunt trauma	3	2	22
Crush injury	2	0	0
Penetrating injury	2	10	1
Other	0	0	3
Unknown	4	0	0
Interval to presentation			
< 1 year	26	2	18
> 1 year	8	10	11
Unknown	5	0	8

Malignancies

In the military population, carcinoma of the testis is of major significance. Although it accounts for only 1% of all male malignancies, it is the most common cancer in the 15–34-year-old age group.[17] In Victoria, testis cancer accounts for 26% of cancers between 15–24 years of age and has its highest incidence in the age range of the ADF population.[18]

3 Testis cancer incidence Victoria 1998[18]

	Age										
	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54
Number	1	0	1	8	18	25	24	15	19	3	12
Crude rate per 100 000	0.6	0.0	0.6	4.9	10.4	13.5	13.6	8.2	11.1	1.9	8.4



These images are from the same patient. The intravenous urogram (left) shows a normal contralateral kidney with loss of function of the lower pole of the left kidney. The computed tomography scans show bilateral function, but also reveals the extent of the haematoma.

The annual age-standardised incidence has risen in Australia in the last 15 years from 3.7 to 5.4 per 100 000 men.[19,20]

The prognosis for seminoma was greatly improved by radiotherapy in the early 20th century and the results for teratoma by effective chemotherapy in the last 20 years. The treatment results for organ-confined seminoma now routinely exceed five-year survivals of 95% and are probably close to 100%. The results for teratoma range from 91%–95% with minimal to moderate disease, falling to 53% with advanced disease.[21] Obviously, early detection and treatment will improve prognosis substantially. Toner et al reviewed 633 cases of testis cancer in the Victorian Cancer Registry reported between 1988 and 1993. They found that 17% of seminomas and 42% of teratomas presented with stage II–III disease.[22]

Self-examination and awareness of scrotal contents is an effective method of finding early stage disease and this should be taught at recruit schools. Lesions are sometimes identified by sexual partners and there is no good reason for information about testicular examination to be presented in a single-sex setting.

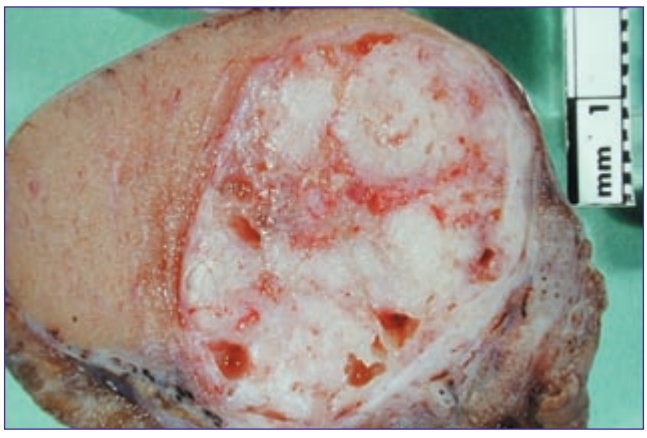
4 Stage of testis cancer at presentation in Victoria 1988–1993[22]

Testis cancer ($n = 633$)					
Seminoma ($n = 357$)			**Teratoma ($n = 271$)**		
Stage I	II	III	Stage I	II	III
291	50	12	158	61	52
83%	14%	3%	58%	23%	19%

Infections

Lower urinary tract infections

It has been estimated that between 10% and 20% of women will have a urinary tract infection in their lifetime,[23] and 27% of young women will suffer one or more relapses in the next six months after their first infection.[24] However, a recent study by Childs and Egan found that only half of the women with recurrent symptoms had a urinary tract infection and 84% of



Teratoma of the testis, showing the variegated appearance of the cut surface, with normal testis on the left of the specimen.

these had a variant type (low colony count, anaerobic or fastidious organism). The other half had urethrotrigonitis syndrome (71%) or interstitial cystitis (29%).[25]

A number of preventive measures have been promoted to reduce the incidence of attacks, their severity and duration and minimise the risk of chronic symptoms. These include:

- a minimum fluid intake of 1.5 litres per day to ensure effective voiding volumes.
- avoiding constipation.
- avoiding nylon underclothes, including pantyhose, in susceptible individuals.
- avoiding soap when washing the perineum.
- adequate lubrication with intercourse.
- emptying the bladder effectively after intercourse with a large volume, for better urethral flushing.
- drinking cranberry juice (for those individuals with recurrent episodes).

Antibiotic prophylaxis is not always necessary but may be appropriate for culture-proven recurrences. If prescribed, antibiotics are usually required for periods of six months or more, although taking them only while sexually active is often effective. Nitrofurantoin and hexamine hippurate are useful and safe for long-term prophylaxis, but trimethoprim and fluroquinolones can be prescribed if contraceptive practices are known to be reliable (these antibiotics may have harmful effects on the fetus).

Sexually transmitted diseases

Clinically relevant sexually transmitted disease patterns have been changing over the last 20 years. The incidence of syphilis in the USA has been rising (11.6/100 000 in 1985 to 18.4/100 000 in 1989), mainly in drug users, and gonorrhoea has declined (371/100 000 in 1985 to 289/100 000 in 1989).[26] Chlamydia trachomatis is now the most prevalent sexually transmitted disease in the United States and this can be presumed to be the case in Australia.[27]

Causes of non-gonococcal urethritis

Human papilloma virus

The incidence of human papilloma virus (HPV) is highest in the 18–28-year age group and 1% of the sexually active population have condylomata, with 15% having a subclinical infection on DNA assay.[28] A new topical therapy is now available to add to podophyllin, which is occasionally difficult to obtain, and surgical ablation. Imiquimod has shown very good clearance rates in a prospective, double-blind, randomised, multicentre trial reported by Beutner et al.[29] It is thought to have an immunological effect, binding to monocytes and macrophages, inducing cytokine production and upregulating natural killer cells. The drug is applied three times a week at night and the results should be apparent at 12–16 weeks. The treatment is expensive.

5 Infective causes of urethritis[26]

Bacterial	Other
Chlamydia	Trichomonas
Ureaplasma	Herpes
Mycoplasma	Adenovirus
Haemophilus	Unknown

Prostatitis

Prostatitis is a very common condition, but progress on understanding the pathology and treatment has faltered over the last few decades. The condition has a prevalence of 5%–8% in a community-based study,[30] and the impact on quality of life has been found to be similar to a recent myocardial infarction, unstable angina or active Crohn's disease.[31] Chronic epididymitis may be regarded as a similar condition to chronic prostatitis.

Prostatitis should be classified according to the US National Institutes of Health definitions (Box 6). A useful evaluation of chronic cases can be made using the NIH chronic prostatitis symptom index.[31] This symptom index has had its utility confirmed after three years of clinical and research use.[32]

The management of categories I and II prostatitis is relatively straightforward, although severe or repeatedly relapsing chronic bacterial prostatitis occasionally causes clinical problems. Category IV prostatitis does not need treatment due to lack of symptoms.

Category III prostatitis remains a major management difficulty. A review of the literature covering diagnostic tests and treatment was carried out by McNaughton et al, who concluded that:

- there is no reliable diagnostic test
- treatment studies were poor, with small samples
- the use of antibiotics and α-blockers was not supported by the evidence presented.[33]

Nevertheless, patients with Category III prostatitis should have a trial of tetracycline and quinolone sequentially (usually four weeks each). If these fail, no further antibiotic therapy is indicated. Alpha blockade medication (prazosin, terozosin, tamsulosin) may relieve obstructive symptoms. Further empirical medications include non-steroidal anti-inflammatory agents, finasteride (Proscar), pentosan polysulphate (Elmiron) and phytotherapy. Psychological and general support should not be neglected — reassurance about the benign nature of the condition, along with stress management or relaxation therapy strategies, will reduce co-existent anxiety significantly.

Bladder function

Lower urinary tract symptoms (LUTS), including frequency, urgency, dysuria, hesitancy, poor flow, terminal dribbling, incomplete emptying and unsatisfied micturition, are generally considered to be problems of older males, but significant num-

6 NIH classification of prostatitis[32]

Category I	Acute bacterial prostatitis
Category II	Chronic bacterial prostatitis
Category III	Chronic abacterial prostatitis/chronic pelvic pain syndrome
Category IV	Asymptomatic inflammation of prostate

bers of young males and females have symptoms. Most have a temporary or obvious cause, such as acute infection or chronic prostatitis, but some are not aware of their condition until they are able to compare themselves with those who have a normal voiding pattern. Very occasionally, new onset voiding dysfunction is an early manifestation of neurological disease.

Idiopathic bladder instability (over-active bladder) is often effectively managed with behavioural interventions (biofeedback and bladder retraining) and anticholinergic medication. At effective dose levels, even the modern anticholinergic drugs (eg, oxybutynin, tolterodine) may produce side effects that degrade performance, including problems with short distance focus and constipation.[34]

Bladder-neck dyssynergia causes symptoms of outlet obstruction and is effectively managed with alpha α-blocking medication. Drugs have improved from vascular agents (phenoxybenzamine, prazosin) to highly selective bladder agents (terozosin, tamsulosin), but these may still cause postural hypotension and are contraindicated in activities associated with raised positive Gz forces.[35] The surgical alternative of a bladder-neck incision is an option when irremediable infertility is acceptable.

Conclusion

Urological conditions can often be prevented or minimised by simple actions and advice from health service staff. Appropriate management will take into account the military environment, which may require only minor change to produce an effective result.

The changing patterns of disease mean that ongoing observation of medical conditions is very useful to provide timely advice. The involvement of clinical specialists in reviewing and advising on problems in general, as well as treating conditions in particular, can be beneficial and should be used at every opportunity.

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